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10/587,625	05/24/2007	Young Nam Kim	03113.0002.PCUS00	3583

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EXAMINER	
MARTINEZ, BRITTANY M	

ART UNIT	PAPER NUMBER
1793	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/587,625	KIM, YOUNG NAM	
	Examiner	Art Unit	
	BRITTANY M. MARTINEZ	1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *25 July 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☐ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☒ Claim(s) *1, 7, 8, 10 and 15-18* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *25 July 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☒ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *7/25/2006 and 8/19/2009*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Status of Application

Claims 1-20 are pending in the instant application and have been examined.

Priority

The instant application is a national stage entry of PCT/KR05/00337, filed February 4, 2005, which claims priority with regard to Korean Patent Application No. 10-2004-0008417, filed February 9, 2004.

Claim Objections

1. **Claims 1, 7, 8, 10 and 15-18** are objected to because of the following informalities: "the" should be placed before "carbon nanotubes" in line 4 of **Claim 1**; "the" should be placed before "carbon nanotubes" in line 2 of **Claim 7**; "the" should be placed before "carbon nanotubes" in lines 2 and 3 of **Claim 8**; one of "The process according to claim 1" or "The process according to claim 9" in **Claim 10** should be deleted; "comprised" in **Claim 10** should be changed to "comprises;" the "having" in line 2 of **Claim 15** should be changed to "comprising;" the "having" in line 2 of **Claim 16** should be changed to "comprising;" "the" should be placed before "carbon nanotubes" in line 2 of **Claim 17**; and "the" should be placed before "carbon nanotubes" in lines 2 and 3 of **Claim 18**. Appropriate correction is required.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. **Claims 1, 3-6, 10, 11, 13 are 14** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention.

4. **Claim 1** recites the limitation "the catalyst-loaded carbon nanotubes" in the 3rd line of the claim. There is insufficient antecedent basis for this limitation in the claim.

5. The term "tightly" in **Claim 1** is a relative term which renders the claim indefinite. The term "tightly" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention.

6. With regard to **Claim 3**, the phrase "metals or metal compounds applicable to the preparation of Y-branched carbon nanotubes" renders the claim indefinite. It is unclear what "applicable to the preparation of Y-branched carbon nanotubes" means.

7. In **Claim 4**, "metal per se" renders the claim indefinite. It is unclear what is meant by "metal per se."

8. **Claim 4** recites the limitation "the mixture" in the 2nd-3rd lines of the claim. There is insufficient antecedent basis for this limitation in the claim.

9. With regard to **Claim 5**, the phrase "at least one or more" utilizes improper alternative terminology.

10. The portion of **Claim 6** that reads "catalyst is carried out by…or…or" utilizes improper alternative terminology.

11. The portion of **Claim 10** that reads "The process according to claim 1, The process according to claim 9," renders the claim indefinite. It is unclear from which claim, **Claim 10** depends.

12. **Claim 10** recites the limitation "the suspension" in the 2nd line of the claim. There is insufficient antecedent basis for this limitation in the claim if the claim depends from **Claim 1**.

13. The portion of **Claim 11** that reads "selected from the group consisting of…and…and" utilizes improper Markush terminology/format. See MPEP § 2173.05(h).

14. With regard to **Claim 13**, the phrase "at least one or more" utilizes improper alternative terminology.

15. With regard to **Claim 14**, the phrase "having multiple Y-junctions repeated twice or more" renders the claim indefinite. It is unclear whether the claim merely requires multiple Y-junctions or if the claim requires sections of multiple Y-junctions repeated. Further, the phrase "repeated twice or more" utilizes improper alternative terminology.

Claim Rejections - 35 USC § 102/103

16. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

17. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

18. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

19. **Claims 1-9, 12, 13, 15 and 17-20** are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Tsai et al. (*Carbon*).

20. With regard to **Claim 1**, Tsai discloses a process for preparing Y-branched carbon nanotubes comprising the steps of: (a) loading a catalyst on a carbon nanotube carrier; (b) pre-treating the catalyst-loaded carbon nanotubes to have the catalyst bonded tightly to the surface of the carbon nanotubes; and (c) performing a synthetic reaction of carbon nanotubes using the obtained catalyst-loaded carbon nanotubes (Tsai, Fig. 1-3; p. 1900-1901).

21. With regard to **Claim 2**, Tsai discloses the carbon nanotube carrier being a carbon nanotube or carbon nanofiber (Tsai, Fig. 1-3; p. 1900-1901).

22. With regard to **Claims 3-5**, Tsai discloses using nanocrystalline Pd as the catalyst (Tsai, Fig. 1-3; p. 1900-1901).

23. With regard to **Claim 6**, Tsai discloses the step of loading a catalyst carried out by chemical vapor deposition (Tsai, Fig. 1-3; p. 1900-1901).

24. With regard to **Claims 7 and 17**, Tsai discloses the tight bonding between the catalyst and the surface of carbon nanotubes accomplished by a chemical pre-treatment such as oxidation, reduction, or hydrogenation, or a physical pre-treatment such as high temperature treatment (the actual growth of the initial nanotube from the catalyst particle) (Tsai, Fig. 1-3; p. 1900-1901).

25. With regard to **Claims 8 and 18**, Tsai discloses the tight bonding between the catalyst and the surface of carbon nanotubes caused by decomposition, damage or destruction of the surface of the carbon nanotubes (the actual growth of the initial nanotube from the catalyst particle) (Tsai, Fig. 1-3; p. 1900-1901).

26. With regard to **Claims 9, 19 and 20**, Tsai discloses the synthetic reaction performed using a suspension in which the catalyst-loaded carbon nanotubes are dispersed in solvent (ethanol) (Tsai, p. 1901).

27. With regard to **Claim 12**, Tsai discloses the synthetic reaction performed by chemical vapor deposition or plasma method (Tsai, Fig. 1-3; p. 1900-1901).

28. With regard to **Claim 13**, Tsai discloses Y-branched carbon nanotubes having at least one Y-junction (Tsai, Fig. 1-3; p. 1900-1901).

29. With regard to **Claim 15**, Tsai discloses material for an electronic product having Y-branched carbon nanotubes (Tsai, Fig. 1-3; p. 1899-1901).

30. **Claims 1-9, 12, 13, 15 and 17-20** are also obvious over Tsai because anticipation is the epitome of obviousness.

31. **Claims 13 and 15** are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Li et al. (US 6,325,909 B1).

32. With regard to **Claim 13**, Li discloses Y-branched carbon nanotubes characterized by having at least one Y-junction (Li, "Abstract;" Fig. 3b, 4a, 4b).

33. With regard to **Claim 15**, Li discloses a transistor having Y-branched carbon nanotubes (Li, "Abstract;" Fig. 3b, 4a, 4b).

34. With regard to **Claims 13 and 15**, the process for producing the composition is held to be obvious, when the reference teaches a product that appears to be the same as, or an obvious variant of, the product set forth in a product-by-process claim although produced by a different process. See In re Marosi, 710 F.2d 799, 218 USPQ 289 (Fed. Cir. 1983), and In re Thorpe, 777 F.2d 695, 227 USPQ 964 (Fed. Cir.1985). See also MPEP 2113.

35. **Claims 13-16** are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Ting et al. (US 2003/0118727 B1).

36. With regard to **Claim 13**, Ting discloses Y-branched carbon nanotubes characterized by having at least one Y-junction (Ting, "Abstract;" 0019; 0032; 0035; 0036; 0037; Fig. 1-3; Claim 14).

37. With regard to **Claim 14**, Ting discloses Y-branched carbon nanotubes characterized by having multiple Y-junctions repeated twice or more (Ting, "Abstract;" 0019; 0032; 0035; 0036; 0037; Fig. 1-3; Claim 14).

38. With regard to **Claims 15 and 16**, Ting discloses a transistor and a material for an electronic product having Y-branched carbon nanotubes (Ting, "Abstract;" 0019; 0032; 0035; 0036; 0037; 0039; 0041; Fig. 1-3; Claim 14).

39. With regard to **Claims 13-16**, the process for producing the composition is held to be obvious, when the reference teaches a product that appears to be the same as, or an obvious variant of, the product set forth in a product-by-process claim although produced by a different process. See In re Marosi, 710 F.2d 799, 218 USPQ 289 (Fed. Cir. 1983), and In re Thorpe, 777 F.2d 695, 227 USPQ 964 (Fed. Cir.1985). See also MPEP 2113.

Claim Rejections - 35 USC § 103

40. **Claims 10 and 11** are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsai et al. (*Carbon*) as applied to **Claims 1 and 9** above, and further in view of Kishi et al. (US 6,869,581 B2).

41. Tsai does not disclose the suspension additionally comprising a surfactant (**Claim 10**) selected from the group consisting of non-ionic, anionic, cationic, binary ionic surfactants, carbohydrates, silicones, and fluorocarbons (**Claim 11**). However, the use of surfactants such as sodium dodecylsulfate (an anionic surfactant) in carbon nanotube dispersions is well-known in the art, as evidenced by Kishi (Kishi, c. 8, l. 56-

65). Thus, it would have been obvious to one of ordinary skill in the art to modify the suspension of Tsai with the surfactant of Kishi in order to obtain a uniform dispersion of carbon nanotubes (Kishi, c. 8, l. 56-65).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to BRITTANY M. MARTINEZ whose telephone number is (571) 270-3586. The examiner can normally be reached on Monday-Friday 8:30AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stanley Silverman can be reached on (571) 272-1358. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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